The Sizewell C Project

SZC Co.'s Response to the Secretary of State's Request for Further Information dated 25 April 2022: Appendix 1 - Response to Mr Scarr's Submission.

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APPENDIX 1

SZC CO.'S RESPONSE TO MR NICK SCARR'S CORRESPONDENCE TO BEIS REGARDING EN010012 18TH MARCH 2022 SECTION 5 'COASTAL CONSIDERATIONS'

APPENDIX 1

RESPONSE TO MR NICK SCARR

Table 1: SZC Co.'s Responses to Mr Nick Scarr's correspondence to BEIS regarding EN010012 Section 5 Coastal Considerations

Ref	Who	Question / Answer
Preamble		
1	NS	It is my understanding that the Environment Agency is a Statutory Consultee and, in this role, can make comments on the Applicant's Flood Risk Assessment. Despite the assertions of the Applicant to the contrary, the EA is not in a position to validate the Applicant's Flood Risk Assessment.
	SZC Co	The Environment Agency's position in respect to the Flood Risk Assessments provided by SZC Co. is described in the respective Statement of Common Ground submitted as REP10-094.
	NS	REP10-124 TR544, authored by Cefas as party to the Applicant, states as follows: "4.2.2 Beast from the East storm sequence To examine erosion from a more severe (erosive) storm throughout the decommissioning phase, the 2D modelling considered the full Beast from the East (BfE) storm sequence, which has a 1:107 year return interval in terms of cumulative wave power (see Appendix B of BEEMS Technical Report TR531 Rev 2). Statistically speaking, such a storm may be expected to occur once or twice within the whole project lifetime of Sizewell C. To reflect this, the BfE storm sequence is assumed to occur once within a 60-year period when determining recharge intervals throughout the lifetime of Sizewell C. **This is an additional conservative measure, with the reduced return interval creating larger erosive rates and smaller recharge intervals. The modelled runs (at 2120 and 2140) used the future receded shorelines topography in line within the previous section.**"
	SZC Co	No comment – the bold and non-bold text are correct and are quoted from [REP10-124]. The measure is conservative because it considers two BfE-like events between commencement of construction and 2140. That is, two 107 year return interval events in 138 years.

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2	NS	Important points relating to TR544 REP10-124: 1. A 1:107 storm sequence is claimed to *'…occur once or twice within the whole project lifetime of Sizewell C'*. This can be expressed in another way – over the project lifetime (2022-2190) a span of 168 years there is a 79.4 % chance of its occurrence. See https://www.weather.gov/epz/wxcalc_floodperiod 2. The 1:107-year return period claimed for the Beast from the East storm refers to **cumulative wave power only** and not storm surge. Should the '79.4% chance of a Beast from the East storm' coincide with a significant storm surge or significant climate change sea level rise the repercussions to the SCDF could be manifestly different. 3. The Applicant claims that it has '*conservatively modelled'* by using '*…the future receded shorelines topography in line within the previous section.' This is previously claimed as being the* ***severely receded shorelines*** *(Sections 3.2.2 and 3.2.3, respectively.* See TR544 REP10-124 3.2.2 Page 44. The *'severely receded shoreline'* claimed by TR544 is shown following (Page 49 TR544 REP10-124) **In my view, this shoreline cannot be regarded as 'severely receded' and hence cannot be regarded as 'conservative modelling'.** 4. TR544 has a reliance on the idea that sediment and shingle is *'…effectively confined to the system (and is also likely to increase once Dunwich Cliffs begin to erode)'* see Page 45 TR544. This statement is not supported by evidence in the Applicant's own BEEMS documentation as follows: "*The last 2 to 3 decades of strong erosion at Dunwich were not matched by ongoing accretion in the south*." BEEMS TR223 Table 12, shows net erosion of the Sizewell C foreshore since 1993.
	SZC Co	The modelling underpinning BEEMS Technical Report TR544 [REP10-124] can be found in TR545 [REP9-020]. The water levels and waves used for the Beast from the East model came directly from measurements of that event at Sizewell. Beach erosion under storm surge was tested using the design storm that included: • a 1 m storm surge occurring at high tide (springs) and

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		• the instantaneous 1:20 year wave height (i.e., notionally occurring for one hour every 20 years) held constant for 13-hours. Although the historical patterns of sediment supply from Dunwich Cliffs to Minsmere and Sizewell Beaches are not always clear, this is not significant in terms of the evidence included in BEEMS Technical Report TR544 because the coastal defence system at Sizewell C and the numerical modelling (including the use of receded shorelines) underpinning BEEMS Technical Report TR544 [REP10-124], has no reliance on sediment from the cliffs or the behaviour of Dunwich Bank. Should higher than expected sea levels and a potentially lowered Dunwich Bank increase wave energy acting on the cliffs, leading to erosion, then a mixture of sand (0.06 – 2 mm) and pebble-sized (2 – 64 mm) sediments would be eroded and transported south towards Minsmere and Sizewell shorelines. If the eroding cliff sections produce pebbles, beach volumes will increase and the pebbles would largely remain within the Greater Sizewell Bay. This was demonstrated through evidence from shingle tracer studies, numerical modelling and sediment distribution maps included in Volume 2 Appendix 20A of the ES ([APP-312]). Were this to occur, the frequency of SCDF recharges could decline as a result of the additional supply of pebbles. To increase the conservative nature of the evidence presented in BEEMS Technical Report TR544 [REP10-124], no account was taken of the supply of pebbles from Dunwich Cliffs to increase the volume of the SCDF. If the eroded cliff sections are primarily sandy, those sediments are expected to move along the subtidal longshore bars and be mixed in and out of the subaerial beach, not necessarily contributing to long-term beach volumes. This is one reason why historical erosion of Dunwich Cliffs does not always translate into accretion on Minsmere and Sizewell beaches (the distribution of eroded sediments themselves may vary but the material is retained with the overall system). Mr Scarr does not provide any rationale in support of his view that the adjacent shoreline recession case is not 'severely receded'. The severely eroded adjacent (to the SCDF) shoreline case is derived from the EIA evidence base (Section 7.7 of Appendix 20A, Volume 2 of the Environmental Statement [APP-312]), agreed with the regulators and conservatively takes no account of additional sediment supply arising from the SCDF (which would have acted to counter this degree of recession).

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		This case (approximately 85 m relative to the SCDF) is fit for its purpose of testing SCDF viability under the conditions of high longshore transport and SCDF erosion rates, which would be expected for receded adjacent shorelines. Despite the higher rates of SCDF sediment loss in this simulation, the SCDF was still shown to be viable across the life of the station (to 2140) [REP10-124]. The case for why the modelling is conservative is made in BEEMS Technical Reports TR544 and TR545 [REP10-124 and REP9-020, respectively] and reiterated in the response to the response given at Ref 6 of this document below. Given the importance of particle size, the text preceding the quote in Nick Scarr's point 4 "TR544 has a reliance on the idea that sediment and shingle is '*…effectively confined to the system…*" is taken out of context. In full, the quote in TR544 states '*(i) sand supply is expected to remain similar or increase (Brooks and Spencer, 2012), (ii) shingle is effectively confined to the system (and is also likely to increase once Dunwich Cliffs begin to erode)*' That is, the pebbles are confined to the system, but the sand is not.
Summary and brief history of communications		
3	NS	I have coherently expressed in papers submitted to the Planning Inspectorate that the safety and security of the nuclear foreshore, and in particular Sizewell C, is reliant on the offshore Sizewell-Dunwich banks, a statement validated by the Applicant's own work in pre-DCO BEEMS documents. The Applicant fully acknowledges in these pre-DCO BEEMS reports that the loss of the Dunwich bank could see a return to severe coastline stress at Sizewell. Extreme erosion at Sizewell has historical precedent before the banks were formed. See REP2-393.
	SZC Co	As previously stated in the response to ExQ2 CG.2.10 [REP7-056] submitted at Deadline 7, Section 5.3 of **Appendix A** of the Coastal Modelling Report (**Appendix 1** of the **Main Development Site (MDS) FRA** [APP-094]), discusses the sensitivity

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		around the presence of the Sizewell – Dunwich Bank and its impacts on nearshore wave conditions and concludes that the Baseline scenario, i.e. with the Sizewell – Dunwich bank in situ, resulted in more conservative (i.e. worst case) nearshore wave conditions than with their removal. As such, the scenario with the bank in place was adopted in the **MDS FRA** for all scenarios and epochs as a conservative approach. Furthermore, the response to CG.2.11 [REP7-056] (iii) states: *"SZC Co. has always considered that the Sizewell – Dunwich Bank plays a role in reducing the inshore wave energy. This was demonstrated in various BEEMS reports (also synthesized in Volume 2, Appendix 20A of the ES [APP-312]) on the historical bank variability and in wave modelling. […] Closer to the DCO application, and in particular during the EGA, it became clear that the shoreline behaviour is incoherent and shows no clear linkage to the form of the bank."*
4	NS	The SCDF and the HCDF of the proposed Sizewell C do not protect the landward side of the main nuclear platform, a side exposed to the low-lying, contiguous Sizewell and Minsmere marshland which is highly vulnerable to shoreline recession risk should there be loss of the Dunwich bank. See REP2-393.
	SZC Co	SZC Co. notes that assessment of the above risk has previously been considered in the response to ExQ2 CG.2.10 [REP7-056] (iv) which states: *"Degradation of the Sizewell-Dunwich banks would not have an impact on extreme still water levels and therefore would not increase the risk of inundation to the landward side of the main development platform. In the event of shoreline recession to the north or south of the proposed Sizewell C site, wave overtopping of the existing coastal defences and further wave propagation behind the existing Sizewell A and Sizewell B stations would result in wave energy dissipation, and the wave action at the landward side of the main development platform would therefore not be significant."*
5	NS	There is no plausible mechanism that could justify the assumption for the maintenance and preservation of the unconsolidated mud and shingle of the Dunwich bank over the next two 100-year episodes of coastal processes, the uncertainties of which can only be increased by climate change sea-level rise and storm level change.

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	SZC Co	Dunwich Bank is made from sand, not shingle or mud. There is good evidence to suggest that the volume of sand being supplied to the Sizewell – Dunwich Bank complex would rise or remain similar. Numerical modelling, topography and analysis of bed sediments indicate that Dunwich Bank is fed sand from the coastal system via Thorpeness and Sizewell Bank. Brooks and Spencer (2012) showed that future sea level will increase cliff erosion and sand supply in the region, and therefore it is likely that the sediment supply will rise, and the sediment transport pathway will remain. However, the bank crest will become deeper relative to the sea surface if sea level rise outstrips sand supply. Furthermore, there is no evidence to suggest, nor known mechanism by which, the sediment supply pathway would be cut off during the life of the station.
6	NS	The Applicant, however, in its main DCO FRA and EGA both relies on, and assumes the permanence of, the Sizewell-Dunwich banks over the lifetime of the plant. I acknowledge that the Applicant has attempted to address this by submitting TR545 at a late stage in the DCO process, but TR545's claims to conservative (precautionary) modelling are, in my opinion, mainly misplaced as shown in my document REP7-220 and particularly so if such claims are contextualised to be representative of overall flood and erosion risk modelling of the proposed Sizewell C.
	SZC Co	Expert Geomorphological assessment (EGA): The purpose of the EGA, as set out in the Evidence Synthesis for Coastal Geomorphology [APP-312], was to review the potential for future shoreline change that could lead to exposure of the Hard Coastal Defence Feature (HCDF) without secondary mitigation (beach maintenance). The EGA projected exposure of the HCDF in the 2053-2087 window (i.e., within the latter half of the operational phase of the station), following which the exposed HCDF would begin to interrupt longshore sediment transport, causing a gradual build-up (accretion) of sediment on the north side of the station and with that gain, a counter-loss (due to sediment starvation) to the south. To avoid this impact, mitigation – the creation and maintenance of an enlarged beach or Soft Coastal Defence Feature (SCDF) – was proposed.

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		As the EGA demonstrated HCDF exposure without mitigation is likely (during the station's life), there is no need to specifically consider a no bank scenario, as that would only lead to the same conclusion – that mitigation to avoid HCDF exposure is needed. Bank presence in the EGA is justified because there are no plausible mechanisms to significantly disrupt the supply of sand to the bank over the few decades before unmitigated HCDF exposure. Based on present coastal management strategies (including Sizewell C), this statement also holds across the station's life. SZC Co. has already responded to comments of the same nature made by Interested Parties in Examiners Questions CG2.11 – CG2.16 of [REP10-164]. <u>Flood Risk Assessment (FRA):</u> SZC Co. provided clarification with regards to the assessment of the Sizewell – Dunwich Bank, in relation to flood risk, in the response to ExQ2 CG.2.10 submitted at Deadline 7 [REP7-056] which noted that **Appendix 1** of the **MDS FRA** [APP-094] provides clarification on the approach adopted. It is acknowledged that this clarification was provided at the same deadline as Mr Scarr's Deadline 7 response [REP7-220]. Further comments were also received from Mr Scarr at Deadline 8 [REP8-248]. Further clarification in response to the above comments raised by Mr Scarr were subsequently supplied at Deadline 10 in the response to ExQ2 CG.2.10 [REP10-164] where it was noted that: "*SZC Co.'s position remains as previously stated in CG.2.10 at Deadline 7 – As discussed in Section 5.3 of Appendix A of the Coastal Modelling Report (Appendix 1 of the MDS FRA [APP-094]), the assessment concluded that the Baseline scenario, i.e. with the Sizewell - Dunwich bank in situ, resulted in more conservative (i.e. worst case) nearshore wave conditions than with their removal.* *SZC Co. notes that the assessment undertaken for the MDS FRA does not assume that the Sizewell – Dunwich bank will remain in place over the life-time of the development. Instead SZC Co. has tested a number of scenarios with regard to whether the bank is in place (fully or partially) or no longer in situ, for both the present day and future scenarios (i.e. beyond*

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		operational life-time) to determine which would result in the worst-case impact in terms of flood risk to the Project. Based on the outcomes of this wave modelling exercise it was determined that the scenario, i.e. with the Sizewell - Dunwich bank in situ, resulted in more conservative (i.e. worst case) nearshore wave conditions than with their removal and therefore would pose the greatest flood risk to the Project. As the Environment Agency noted above at D7, the approach taken by SZC Co. 'therefore discounts the influence of the banks in reducing wave height, resulting in a precautionary assessment (since wave height, period, energy etc. in the model is therefore likely to be greater than it would in reality given the controlling influence of the banks on the inshore zone across the Greater Sizewell Bay)'." Furthermore, the Deadline 10 response noted that: *"The latest assessment, summarised in BEEMS Technical Report TR545 [REP3- 048], was undertaken to consider beach erosion and viability of the soft coastal defence feature in relation to a specific event, i.e. the Beast from the East storm, and therefore has separate objectives from the MDS FRA. […] The modelling undertaken by SZC Co. for each of these assessments has separate purposes, requiring the application of different modelling approaches and therefore they are not directly comparable."* On the basis of the above, SZC Co. reiterates that at no point has the assessment set out in the **MDS FRA** relied on the assumed permanence of the Sizewell-Dunwich Bank, rather the assessment identified that the scenario with the Sizewell - Dunwich bank *in situ*, resulted in more conservative (i.e. worst case) nearshore wave conditions than with their removal and therefore was the approach adopted within the Flood Risk Assessment. The modelling set out in TR545 had a different purpose than for the assessment of flood risk and, therefore, was not provided by SZC Co. as justification for the approach adopted in the **MDS FRA.** Why the modelling in BEEMS Technical Report TR545 [REP9-020] and the supporting assessment of Soft Coastal Defence Feature viability in BEEMS Technical Report TR544 [REP10-124] is conservative: It is important to note: • that the modelling presented in BEEMS Technical Reports TR544 and TR545 [REP10-124 and REP9-020, respectively] is specifically for testing the viability of the Soft Coastal Defence Feature (SCDF); and

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		• that SZC Co has committed to maintaining the SCDF over the lifetime of the station (see the Coastal Processes Monitoring and Mitigation Plan (CPMMP) [REP10-041] to be approved by the East Suffolk Council (ESC) pursuant to DCO Requirement 12 and by the Marine Management Organisation (MMO) pursuant to Deemed Marine Licence Condition 14). Several layers of conservatism were built into the modelling and assessment: BEEMS Technical Report TR545 [REP9-020]: • Sizewell – Dunwich Bank was not included in the modelling, meaning that waves at the beach would be larger than expected and that the concerns regarding a highly unlikely no-bank scenario have already been addressed. • The extreme RCP8.5 95th percentile sea level rise scenario was modelled (1.66 m of sea level rise at 2140, with respect to the 2020 sea level). • The design storm applied the instantaneous 1:20 year wave height continuously for 13 hours. • The real 1:107 year Beast from the East storm was modelled (for different future sea levels and future shorelines). • Assessments of viability were based on the calibrated sand only model, which consistently overpredicts erosion (compared to observed changes on the mixed sand-gravel beach) and is substantially more erosive (by a factor of at least 2-3) than the gravel model. • Modelling was also conservative because it did not include the expected rise in sediment supply due to increased cliff exposure (Kessingland – Dunwich frontage) from sea level rise. BEEMS Technical Report TR544 [REP10-124]: • This report is descriptive based on the conservative modelling elements listed for Technical Report TR545 [REP9-020]. • The SCDF would be maintained such that only the volume within the sacrificial layer would fluctuate, thereby leaving a large safety buffer layer should the sacrificial layer be unexpectedly depleted.

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		• The sacrificial SCDF volume was kept artificially low (i.e., by proposing a high-volume buffer layer), which decreases the recharge interval (and therefore increases beach recharge frequency), to provide a robust viability test. In reality, the sacrificial layer will be much larger and more resilient than shown by the modelling. • Assessment was based on the narrowest, lowest volume section of the SZC frontage. • Three consecutive storms without recharge were considered in determining the SCDF buffer volume. • Estimates of the beach recharge frequency, or how many times beach recharge could be expected across the station's life, also used the Dutch Design Method, increasing the predicted volume loss by a further 40%. Erosion modelling of more extreme storms (with an offshore joint wave height / water level return interval of 1:10,000 years) acting on a depleted beach, did not lead to exposure of the HCDF or its toe. That modelling included extreme wave heights of 8.95 m paired with water levels 3.74 m above Ordnance Datum, which is approximately mean sea level (see Appendix A of SZC Co.'s Response to the Secretary of State's Request for Further Information dated 18 March 2022: Appendix 5 – Updated Position Statement between SZC Co. and the Environment Agency on matters relating to the Preliminary Design and Maintenance Requirements for the Sizewell C Soft Coastal Defence Feature, with associated technical appendices).
7	NS	It should be noted that in TR544, REP10-124, there appears to be no mention of the Sizewell Dunwich banks, an omission that seems perplexing. Could we meaningfully discuss Dover port storm security without clear reference to the importance of Dover harbour wall?
	SZC Co	BEEMS Technical Report TR544 [REP10-124] tested, and successfully demonstrated, the viability of the Soft Coastal Defence Feature to the end of the Decommissioning Phase (2140). As it is based on numerical modelling without the Sizewell-Dunwich Bank present (see Section 2.2.1 of BEEMS Technical Report TR545 [REP9-020]), there is no omission in the report. That is, the report places no reliance on the presence of the bank and instead intentionally models worst case scenarios without any bank at all.

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8	NS	It is also the case that in the Applicant's twenty-two DCO main Flood Risk Assessment and fourteen FRA Addendum documents the Sizewell-Dunwich banks are also not explicitly named. ('Banks' are mentioned in the Addendum of an Addendum without reference to which banks are being referred to). See REP2-393.
	SZC Co	SZC Co. noted in the response to ExQ2 CG.2.10 submitted at Deadline 7 [REP7-056] that Section 5.3 of **Appendix A** of the Coastal Modelling Report (**Appendix 1** of the **MDS FRA** [APP-094]), summarised the assessment undertaken for the offshore sand banks. Whilst, the Sizewell-Dunwich Bank was not named explicitly in this document, SZC Co. has been consistent throughout the Examination that, in this context, the assessment was referring to the Sizewell – Dunwich Bank. Furthermore, SZC Co. notes that the **MDS FRA** and its accompanying Addendum documents focus on assessing flood risk to the Project as well as off-site receptors from various flood risk sources. As such, limited reference is made to this coastal geomorphological feature, once it has been established that it has been considered within the assessment. SZC Co. reiterates that the Sizewell – Dunwich Bank **has** been included within the assessment of flood risk, where appropriate, as summarised in Section 5.3 of **Appendix A** of the Coastal Modelling Report (**Appendix 1** of the **MDS FRA** [APP-094]). Furthermore, SZC Co. does not believe that any further clarification is required beyond that previously provided.
9	NS	In a meeting with the Environment Agency on 23rd January 2020 it was acknowledged that Sizewell C may become subject to severe shoreline recession resulting in 'islanding'. The consequences of this are not being considered, namely: **in the highly plausible event of significant shoreline recession by and during the next century, Sizewell C could become an established promontory or headland. Thus, sea defences such as the SCDF and HCDF need to fully surround the main nuclear platform.**
	SZC Co	SZC Co notes that its coastal geomorphology experts were not party to the meeting on 23rd January 2020 described by Mr Scarr and it is assumed the meeting was between only Mr Scarr and the Environment Agency. However, SZC Co. notes that assessment of the above risk has previously been considered in the response to ExQ2 CG.2.10 [REP7-056] (iv) which states:

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		"Degradation of the Sizewell-Dunwich banks would not have an impact on extreme still water levels and therefore would not increase the risk of inundation to the landward side of the main development platform. In the event of shoreline recession to the north or south of the proposed Sizewell C site, wave overtopping of the existing coastal defences and further wave propagation behind the existing Sizewell A and Sizewell B stations would result in wave energy dissipation, and the wave action at the landward side of the main development platform would therefore not be significant." Furthermore, a breach to the existing defences north of SZC has been considered up to 2190, as discussed in Section 3.4 of the **MDS FRA Addendum** [AS-158], with the conclusion that the main platform and the SSSI crossing with levels set at 7.3m AOD are not at risk of flooding under the reasonably foreseeable scenario up to 2190.
Sizewell C Main nuclear platform flood resilience in the next century (Submission dated 11/01/2022) – Introduction		
10	NS (Page 1)	The next century will be a critical time for Sizewell C if it is approved and built as presented in the DCO hearing; security from flood risk will be of utmost importance as the spent fuel created by the reactors will be onsite in cooling ponds until its temperature lowers sufficiently to allow removal. The Applicant has made a definitive statement on flood risk to Sizewell C's main nuclear platform for the period. The Applicant states that the 7.3m AOD (Above Ordnance Datum) main nuclear platform will be free from flood risk until 2140 under the RCP8.5 scenario. This is presented in its '*Table 2.1*'.
	SZC Co	SZC Co. would like to clarify that the 'Table 2.1' referred to by Mr Scarr is **not** taken from the **MDS FRA** [AS-018] or the **MDS FRA Addendum** [AS-157]. Instead, the 'Table 2.1' referred to in Mr Scarr's submission is taken from **Appendix E: Coastal Wave Overtopping Modelling Report Addendum** of the **MDS FRA Addendum** [AS-170]. SZC Co. would like to reiterate, as demonstrated by the document from which this reference has been taken, that flood risk to the Project has been subject to extensive supporting assessment and the above conclusion is taken from the suite of

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		studies undertaken to support the **MDS FRA**. In this context and based on the analysis undertaken, this statement is correct with regard to the conclusions that have been reached. It is not appropriate to take a single table in isolation from the wider suite of documents to categorise flood risk to the Project.
11	NS (Page 1)	The Applicant has also made a second definitive statement, presumably informed by the first, that spent fuel will be removed from site by this 2140 date. The following document reviews these crucial statements in the following two short papers.
	SZC Co	The timescales for construction, operation and decommissioning utilised within the **MDS FRA** [AS-018] and the **MDS FRA Addendum** [AS-157] are aligned with those defined within the wider DCO application. The 2140 date has not been informed by the preceding conclusion regarding platform height and flood risk. Instead, the use of the 2140 date has been based on the timescales identified within the DCO application [REP7-032 epage 143], which are subsequently used as parameters to assess flood risk at relevant stages across the development lifetime. Furthermore, to provide greater understanding of the potential future flood risk, the theoretical maximum site lifetime of the station up to 2190 has also been considered in the assessment of flood risk, as required by the guidance set out by the ONR and the Environment Agency in their Joint Advice Note on Principles for Flood and Coastal Erosion Risk Management (2017). This assessment is also included within the **MDS FRA** [AS-018] and the **MDS FRA Addendum** [AS-157]. Further clarification on specific items identified in Paper 1 are provided in the following responses.
Paper 1 - Sizewell C and the wave data used in the Applicant's FRA to establish flood levels on the main nuclear platform in the next century.		

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12	NS (Page 2)	These results are understood to be a composite figure of maximum still water levels (which incorporate climate and storm surge level effects) combined with the impact on those levels from waves overtopping and breaching Sizewell C's defences.
	SZC Co	SZC Co. would like to clarify that Table 2.1 from **Appendix E** of the **MDS FRA Addendum** [AS-170] presents the still water levels applied in the wave overtopping assessment and as such in this context they reflect the joint probability of extreme still water levels and wave conditions for the considered return period events and climate change scenarios. Details of the joint probability assessment was discussed in **Appendix 1** of the **MDS FRA** [APP-094].
13	NS (Page 2)	To examine the component that waves add to the Table 2.1 data it is necessary to abstract the still water level components. These values are shown in the table below by using the following data: • Still water level data (AOD) for storm event return periods used: 1:200 3.13m; 1:1000 3.55m; 1:10,000 4.21m • Climate change sea level rise data used for RCP8.5 scenario: RCP8.5 2100 1.12m; RCP8.5 2140 1.8m; RCP8.5 2200 2.9m; BECC 2200 5.00m
	SZC Co	The above values, provided by Mr Scarr, were not presented in the **MDS FRA** or **FRA Addendum**. As such, no reference has been provided to clarify the origin of the values nor the base year of the extreme still water levels. Therefore, it is not possible to directly compare the values with those previously presented by SZC Co.
14	NS (Page 3)	Table B2 then, shows the maximum contribution of overtopping waves to water levels on and around the platform that could have been allocated by the Applicant for each return period and epoch.
	SZC Co	Values presented in Table 2.1 in **Appendix E** of the **MDS FRA Addendum** [AS-170] present extreme still water levels derived in a joint probability assessment with the extreme wave conditions to be applied specifically in the wave overtopping assessment. Therefore, they should not be used for other assessments that may be taken out of context.

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14	NS (Page 3)	It appears that the Applicant has used 'inshore wave heights of 3.73m - 4.48m' to calculate these wave contributions. See: FRA Main development site Flood Risk Addendum Page 1,2: Table 4.1.
	SZC Co	Nearshore wave heights were used in combination with the extreme still water levels (presented in Table 2.1) to calculate wave overtopping rates over the proposed Hard Coastal Defence Feature. This precautionary approach and the conservative values adopted were agreed with the Environment Agency as noted in SZC Co.'s response provided in this document at Ref 6 (above).
15	NS (Pages 3 and 4)	However, should the offshore Dunwich bank be lost or compromised by the next century[…] then moderate as well as high storm waves […] could breach, break over and erode the 'soft and erodible' inner and outer longshore bars and the South Minsmere levels, immediately to the North of Sizewell C. […] In these scenarios wave action could present significantly greater contributions to flood levels on the main nuclear platform than suggested by Table B2 which, in turn, would then result in an understatement of flood risk in the Applicant's Table 2.1. The adequacy of the flood modelling on the main platform height of 7.3m AOD to 2140 is essentially then dependent upon the assumptions of: • little or no change to the offshore geomorphology (primarily the Dunwich bank and the longshore, nearshore bars) • the present shoreline surrounding Sizewell C remaining uneroded until the middle of the next century with no consideration given to the historical precedent of the Sizewell foreshore being the '*most eroded shoreline'* in records assembled by Pye and Blott until the development of the Dunwich bank (see REP2-393 Section 2) and • no significant unrepaired breaches to sea defences north of the site. In my view there is no plausible mechanism that could justify the assumption for the maintenance and preservation of the unconsolidated Dunwich bank over the next two 100-year episodes of coastal processes, the uncertainties of which can only be increased by climate change sea-level rise and storm level change. This loss could result in significant shoreline erosion around Sizewell C. See my papers REP2-393, REP7-219, REP10-345.

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	SZC Co	Bullet 1: SZC Co. noted in the response to ExQ2 CG.2.10 submitted at Deadline 7 [REP7-056] that Section 5.3 of **Appendix A** of the Coastal Modelling Report (**Appendix 1** of the **MDS FRA** [APP-094]), summarised the assessment undertaken for the offshore sand banks. SZC Co. reiterates that at no point has the assessment set out in the **MDS FRA** relied on the assumed permanence of the Sizewell-Dunwich Bank, rather that the assessment identified that the scenario with the Sizewell - Dunwich bank *in situ* resulted in more conservative (i.e. worst case) nearshore wave conditions than with their removal and therefore this was the approach adopted within the Flood Risk Assessment. In respect of the modelling undertaken to inform the **MDS FRA**, this has not considered changes to the offshore geomorphology over the development's lifetime, based on the adoption of the conservative nearshore wave conditions and the position that appropriate monitoring and subsequent mitigation measures would be in place to ensure the integrity of the SCDF and HCDF up to the end of the decommissioning phase (see the Coastal Processes Monitoring and Mitigation Plan (CPMMP) [REP10-041] to be approved by the East Suffolk Council (ESC) pursuant to DCO Requirement 12 and by the Marine Management Organisation (MMO) pursuant to Deemed Marine Licence Condition 14). In terms of the potential for a breach to the north of the proposed SCDF and HCDF, this has been considered up to 2190, as discussed in Section 3.4 of the **MDS FRA Addendum** [AS-158], with the conclusion that the main platform and the SSSI crossing with levels set at 7.3m AOD are not at risk of flooding under the reasonably foreseeable scenario up to 2190. The SCDF [REP10-124] numerical modelling considered scenarios with lowered or no banks, and therefore did not assume little or no change to the offshore geomorphology as Mr Scarr states. Bullet 2: The earliest recorded shorelines (1736) at Sizewell were the most eroded and Dunwich Bank was not a substantial feature at that time (bearing in mind that survey records from almost three centuries ago will have a high degree of uncertainty). However, the historical shoreline positions are not relevant because the Sizewell C frontage will feature a volumetrically large and maintained beach, called the Soft Coastal Defence Feature. Severe erosion of the adjacent coast was considered in BEEMS Technical Report TR544 [REP10-124] and does not assume the present shoreline to be uneroded as Mr Scarr implies.

Ref	Who	Question / Answer
		Bullet 3: A breach to the existing defences north of SZC has been considered up to 2190, as discussed in Section 3.4 of the **MDS FRA Addendum** [AS-157], with the conclusion that the main platform and the SSSI crossing with levels set at 7.3m AOD are not at risk of flooding under the reasonably foreseeable scenario up to 2190. SZC Co.'s SCDF is not reliant on the presence of Dunwich Bank. Although it is not expected that the banks will remain unchanged over the lifetime of the station, it is considered unlikely that they (especially Sizewell Bank) would disappear (because sand supply is expected to rise with rising sea levels and regional cliff erosion, and there is no evidence to suggest a mechanism to break the sand transport pathway). Sea level rise may, however, outstrip bank growth arising from increased sand supply, resulting in deeper bank. As noted, the case without banks and erosion north of Sizewell C has already been considered in numerical modelling [REP9-020 and REP10-124] and shown that the SCDF remains and erosion is entirely manageable with SCDF recharge.
Paper 2 - Sizewell C and the Applicant's claim for spent fuel removal by 2140. Is this a plausible timeframe?		
16	NS	Spent fuel will be classified as waste. This is currently not the case.
	SZC Co	SZC Co has developed its approach to decommissioning, radioactive waste disposal and spent fuel management in compliance with legislation, policy and guidance set out by the UK Government and Regulators.
17	NS	That there are no over-runs in construction time of Sizewell C and that there are no lifetime extensions to Sizewell C.
	SZC Co	The 2008 Energy Act requires all prospective operators of new nuclear power stations in the UK to have an approved Funded Decommissioning Programme (FDP) setting out the operator's approach and costed plans for decommissioning the power station, which SZC Co will deliver prior to the commencement of construction. As part of the FDP, SZC Co will also provide a Decommissioning Waste Management Plan (DWMP) to demonstrate a credible plan for the long-term management of wastes, particularly "higher activity" wastes and spent fuel.

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		In accordance with the Nuclear Site Licence, the DWMP and Safety Case will be periodically reviewed to ensure adequacy of the flood defences, facilities for managing radioactive waste and spent fuel along with the decommissioning plan, should the life of the plant be extended, or disposal times change.
18	NS	That one accepts the validity of the ONR's downward revision of the required cooling period specified by the NDA from 140 years to 55-60 years.
	SZC Co	Spent fuel cooling rates are specific to the type of fuel and the burn up of the individual assemblies, but it should be noted that no fuel will be sent from the SZC site until it meets the transport and Geological Disposal Facility (GDF) acceptance criteria.
19	NS	That a GDF is available within 120 years, and it will take no more than 10 years to consign the Sizewell C spent fuel.
	SZC Co	The Long-term Nuclear Energy Strategy from the UK Government states that higher activity wastes, which includes spent fuel, are to be placed in a GDF. As one is not currently available, these spent fuels will require on-site storage with a conservative estimate provided by Nuclear Waste Services (formerly Radioactive Waste Management Ltd.) of up to 100 years. As such the Interim Spent Fuel Store at SZC has been designed with an operating life of 100 years. The facility has been designed such that it would be capable of extension beyond this point if necessary subject to any required refurbishment and/or replacement of equipment. Through compliance with UK Government and regulatory policy and guidance, SZC will ensure the safe management of spent fuel and radioactive waste, regardless of removal date
20	NS	That the GDF can accept and consign Sizewell C's spent fuel at the same time as other nuclear waste if necessary. It is not at all clear that this will be the case.
	SZC Co	Please refer to the response provided in this document at Ref 19 above.

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Ref	Who	Question / Answer
21	NS	That the timeframe (considered to be 100 years as far as I am aware) for the deposition of other committed nuclear waste to be consigned prior to Hinkley C and Sizewell C— that is, legacy nuclear waste, including spent fuel from power stations and the highly enriched submarine spent fuel— operates within the allocated timescale without over-run.
	SZC Co	Please refer to the response provided in this document at Ref 19 above.